Complete Summary

GUIDELINE TITLE

ACR Appropriateness Criteria™ for neurodegenerative disorders.

BIBLIOGRAPHIC SOURCE(S)

Braffman B, Drayer BP, Anderson RE, Davis PC, Deck MD, Hasso AN, Johnson BA, Masaryk T, Pomeranz SJ, Seidenwurm D, Tanenbaum L, Masdeu JC. Neurodegenerative disorders. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):597-605. [35 references]

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Neurodegenerative disorders

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Endocrinology
Family Practice
Geriatrics
Internal Medicine
Medical Genetics
Neurology
Pediatrics
Radiology

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for neurodegenerative disorders

TARGET POPULATION

Patients with neurodegenerative disorders

INTERVENTIONS AND PRACTICES CONSIDERED

1. Magnetic resonance imaging:
    - Plain
    - With gadolinium
2. Magnetic resonance spectroscopy
3. Functional magnetic resonance imaging
4. Computed tomography:
    - Plain
    - Intravenous contrast
5. Positron emission tomography
6. Single-photon emission computed tomography

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of recent peer-reviewed medical journals, primarily using the National Library of Medicine's MEDLINE database. The developer identified and collected the major applicable articles.

NUMBER OF SOURCE DOCUMENTS

The total number of source documents identified as the result of the literature search is not known.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus (Delphi Method)
Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement in the formulation of the Appropriateness Criteria. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty (80) percent agreement is considered a consensus. If consensus cannot be reached by this method, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria and the Chair of the ACR Board of Chancellors.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria™

Clinical Condition: Neurodegenerative Disorders

Variant 1: Chorea and/or choreoathetosis.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Magnetic resonance imaging	8	
Magnetic resonance imaging and gadolinium	4	
Magnetic resonance spectroscopy	4	
Plain computed tomography	4	If magnetic resonance imaging not available or contraindicated.
Intravenous contrast computed tomography	2	
Functional magnetic resonance imaging	No Consensus	New applications being developed.
Positron emission tomography	No Consensus	Indicated if magnetic resonance imaging is negative and clinical uncertainty exists.
Single-photon emission computed tomography	No Consensus	New applications being developed.

Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate

Clinical Condition: Neurodegenerative Disorders

Variant 2: Clinical features suggestive of Hallervorden Spatz disease.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Magnetic resonance imaging	8	
Plain computed tomography	4	If magnetic resonance imaging not available or contraindicated.
Magnetic resonance imaging and gadolinium	3	
Intravenous contrast computed tomography	2	
Magnetic resonance spectroscopy	No Consensus	New applications being developed.
Functional magnetic resonance imaging	No Consensus	New applications being developed.
Positron emission tomography	No Consensus	New applications being developed.
Single-photon emission computed tomography	No Consensus	New applications being developed.
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Clinical Condition: Neurodegenerative Disorders

Variant 3: Characteristic clinical features of Leigh's syndrome.

Radiologic Exam Procedure	Appropriateness Rating	Comments

Magnetic resonance imaging	8	
Magnetic resonance imaging and gadolinium	4	
Plain computed tomography	4	If magnetic resonance imaging not available or contraindicated.
Intravenous contrast computed tomography	2	
Magnetic resonance spectroscopy	No Consensus	New applications being developed.
Functional magnetic resonance imaging	No Consensus	New applications being developed.
Positron emission tomography	No Consensus	New applications being developed.
Single-photon emission computed tomography	No Consensus	New applications being developed.
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Clinical Condition: Neurodegenerative Disorders

Variant 4: Clinical features suggestive of mitochondrial disorders.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Magnetic resonance imaging	8	
Magnetic resonance imaging and gadolinium	4	
Plain computed tomography	4	If magnetic resonance imaging not available or contraindicated.
Intravenous contrast computed tomography	2	
Magnetic resonance spectroscopy	No Consensus	New applications being developed.
Functional magnetic	No Consensus	New applications being developed.

resonance imaging		
Positron emission tomography	No Consensus	New applications being developed.
Single-photon emission computed tomography	No Consensus	New applications being developed.
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Clinical Condition: Neurodegenerative Disorders

Variant 5: Parkinson's disease: typical clinical features and responds to levodopa.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Magnetic resonance imaging	7	
Magnetic resonance imaging and gadolinium	3	
Intravenous contrast computed tomography	2	
Plain computed tomography	No Consensus	
Magnetic resonance spectroscopy	No Consensus	New applications being developed.
Functional magnetic resonance imaging	No Consensus	New applications being developed.
Positron emission tomography	No Consensus	New applications being developed.
Single-photon emission computed tomography	No Consensus	New applications being developed.
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Clinical Condition: Neurodegenerative Disorders

Variant 6: Parkinsonian syndrome: atypical clinical features not responsive to levodopa.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Magnetic resonance imaging	8	
Plain computed tomography	4	If magnetic resonance imaging not available or contraindicated.
Magnetic resonance imaging and gadolinium	3	
Intravenous contrast computed tomography	2	
Magnetic resonance spectroscopy	No Consensus	New applications being developed.
Functional magnetic resonance imaging	No Consensus	New applications being developed.
Positron emission tomography	No Consensus	New applications being developed.
Single-photon emission computed tomography	No Consensus	New applications being developed.
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Clinical Condition: Neurodegenerative Disorders

Variant 7: Parkinson's disease: associated dementia.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Magnetic resonance imaging	8	
Plain computed tomography	4	If magnetic resonance imaging not available or contraindicated.
Magnetic resonance imaging and gadolinium	3	

Intravenous contrast computed tomography	2	
Magnetic resonance spectroscopy	No Consensus	New applications being developed.
Functional magnetic resonance imaging	No Consensus	New applications being developed.
Positron emission tomography	No Consensus	New applications being developed.
Single-photon emission computed tomography	No Consensus	New applications being developed.
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Clinical Condition: Neurodegenerative Disorders

Variant 8: Motor neuron disease.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Magnetic resonance imaging – spine	8	
Magnetic resonance imaging – brain	6	If corticospinal tract findings are present.
Plain computed tomography	4	If magnetic resonance imaging not available or contraindicated.
Magnetic resonance imaging and gadolinium	3	
Intravenous contrast computed tomography	2	
Magnetic resonance spectroscopy	No Consensus	New applications being developed.
Functional magnetic resonance imaging	No Consensus	New applications being developed.
Positron emission tomography	No Consensus	New applications being developed.
Single-photon emission	No Consensus	New applications being

computed tomography		developed.

Appropriateness Criteria Scale

1 2 3 4 5 6 7 8 9

1=Least appropriate 9=Most appropriate

Summary

Neurodegenerative disorders are characterized by excessive and premature neuronal death in focal region(s) of the brain. This results in focal atrophy of affected regions of the brain. This regional and specific focal atrophy is a hallmark of the gross pathology and neuroimaging of neurodegenerative disorders. As first recognized by Drayer et al., in the early days of magnetic resonance imaging, Parkinsonian syndromes and many of the other neurodegenerative disorders also show characteristic hypointense signal changes on T2-weighted images.

Alzheimer disease, the most common degenerative disease of the brain, and Pick's disease were discussed in the guideline titled "American College of Radiology Appropriateness Criteria™ for Dementia." Neurodegenerative disorders of the cerebellum and spinal cord were discussed in the guideline titled "American College of Radiology Appropriateness Criteria™ for Ataxia." This guideline document presents the remaining neurodegenerative disorders.

Degenerative Diseases of the Extrapyramidal Nuclei

The extrapyramidal centers are large subcortical nuclear masses from which at several points, output systems emerge. Since mediation and control of the corticospinal tract is the most prominent of these output systems, lesions of the extrapyramidal nuclei typically result in various motor dysfunction.

Huntington's Disease

The usual age of onset of Huntington's disease is in the 4th and 5th decades. It is inherited in an autosomal dominant fashion with complete penetrance. Clinical manifestations are a choreathetosis, rigidity, dementia, and emotional disturbance.

Neuroimaging and pathology studies both show characteristic atrophy of the caudate and/or putamen. Magnetic resonance also shows signal changes of the striatum, either hyperintensity or hypointensity on long TR/long TE images. Neuronal loss accompanied by loss of myelin and gliosis likely results in the hyperintense signal, while iron accumulation likely accounts for the hypointense signal.

Localized 1H nuclear magnetic resonance spectroscopic studies found increased lactate concentrations in the occipital cortex of symptomatic Huntington's disease patients when compared with normal controls. Single-photon emission computed

tomography studies show hypometabolism of the striatum in Huntington's disease and in other types of chorea.

Hallervorden Spatz Disease

Hallervorden Spatz disease is an unusual metabolic disorder characterized by relentless progression of gait impairment, rigidity, dystonic posturing, and mental deterioration. Two types of Hallervorden Spatz disease exist. The pathology affects both the globus pallidus and the pars reticulata of the substania nigra in type 1 but involves only the globus pallidus in type 2. Long-TR/long-TE magnetic resonance images show either hypointense, hyperintense, or mixed signal in these extrapyramidal nuclei. The hypointense signal on magnetic resonance is due to pathologic deposition of iron pigment. The hyperintense signal on magnetic resonance likely is secondary to axonal spheroids associated with demyelination and reactive gliosis.

Leigh Syndrome (Subacute Necrotizing Encephalomyelopathy)

Leigh syndrome, or subacute necrotizing encephalomyelopathy, is a rare neurodegenerative disorder, usually transmitted in an autosomal recessive mode. Age of onset of symptoms is typically less than 2 years (infantile form), but others may present in childhood (juvenile form) and unusually in adulthood. Characteristic clinical features include hypotonia, psychomotor deterioration, ataxia, ophthalmoplegia, ptosis, dystonia, and swallowing difficulty. Many separate Leigh's syndrome, which is the characteristic combination of clinical features described above, from Leigh's disease, which is the classical pathologic findings described below.

The pathology of subacute necrotizing encephalomyelopathy is characterized by capillary proliferation with bilaterally symmetric gray and white matter necrosis, spongiform degeneration or vacuolization, and demyelination. These lesions are hypointense on short TR sequences and hyperintense on long TR sequences. Some lesions on magnetic resonance are transient and resolve with time. Although lesions location may be variable, the most common sites include the putamen, other basal ganglia, brainstem tegmentum, spinal cord, and optic pathways.

Mitochondrial Encephalomyelopathies

The mitochondrial encephalomyelopathies are a group of disorders that have in common mitochondrial abnormalities resulting in multisystem disorders. These disorders include mitochondrial cytopathy, mitochondrial myopathy, Kearns-Sayre syndrome, MERRLA (myoclonus epilepsy, ragged red fibers, and lactic acidosis) and MELAS (mitochondrial myopathy, lactic acidosis, and stroke). Presentation usually is during childhood but may be in adulthood. Certain clinical features are characteristic, including seizures, short stature, mental deterioration, muscles weakness, exercise intolerance, and neurosensory hearing loss. However, patients often have signs and symptoms that are less characteristic.

Mitochondrial disorders should be considered in any infant or child who has abnormalities of the deep gray matter, especially if white matter disease is present as well. MELAS (mitochondrial myopathy, lactic acidosis, and stroke)

syndrome shows bilateral symmetric and asymmetric infarcts that do not correlate with vascular territories, or with common involvement of the basal ganglia, parietal, occipital and temporal lobes and cerebellar hemispheres. With progression of disease, diffuse atrophy develops. Basal ganglionic lesions in MELAS (mitochondrial myopathy, lactic acidosis, and stroke) [and in myoclonic epilepsy and ragged red fibers (MERRF) and Kearns-Sayre syndrome] not uncommonly calcify.

Positron emission tomography evaluation of cerebral blood flow, oxygen metabolism, and glucose metabolism may be useful to assess the pathophysiology and for diagnosis of mitochondrial encephalomyopathy.

Diseases of the Substantia Nigra: Parkinsonism

Primary Parkinsonian syndromes include Parkinson's disease, progressive supranuclear palsy, and striatonigral degeneration. The latter may be associated with olivopontocerebellar degeneration and/or Shy Drager syndrome in multiple system atrophy.

Parkinson's Disease

Idiopathic Parkinson's disease is relatively common. Two to three percent of the population may be expected to develop Parkinsonism at some time during life. The age of onset usually ranges between 50 and 60 years of age.

The neuropathologic hallmark is loss of neuromelanin containing neurons, gliosis and Lewy body formation in the substantia nigra (mainly the pars compacta), the locus nucleus, the dorsal nucleus of the vagus, and the substantia innominata. On magnetic resonance, the width of the pars compacta is diminished in Parkinson's disease patients compared to controls: overlap between groups, however, does exist. This diminished width, also found in progressive supranuclear palsy and striatonigral degeneration, is thought to reflect selective neuronal loss of the pars compacts.

Proton magnetic resonance spectroscopic studies found an increase in lactate in the occipital lobe in patients with Parkinson's disease compared to controls. ^{18}F-dopa Positron emission tomography can detect frontal changes in Parkinson's disease and preclinical disease in 30% of asymptomatic adult relatives of familial cases. Single-photon emission computed tomography with ^{123}Iiodobenzamide predicts dopaminergic responsiveness in patients with Parkisonism.

Striatonigral Degeneration

Striatonigral degeneration is characterized clinically by Parkinsonian symptoms with prominence of rigidity and with an absent or poor response to antiparkinsonian medication.

Neuroimaging and gross pathology show atrophy of the striatum due to neuronal loss with the putamen more involved than the caudate. At 1.5T, long TR/long TE images show putaminal hypointensity, particularly along its posterolateral margin, equal or more evident than pallidal hypointensity. The degree of hypointense

signal correlates significantly with the severity of rigidity. The hypointense signal is due to the paramagnetic effect of iron. When striatonigral degeneration is associated with olivopontocerebellar degeneration (i.e. in multiple system atrophy), characteristic magnetic resonance changes of olivopontocerebellar degeneration also occur. Positron emission tomography with 18^F fluorodopa is useful in differentiating between Parkinson's disease and multiple system atrophy.

Shy Drager Syndrome

Shy Drager syndrome is characterized by autonomic nervous system failure (orthostatic hypotension, urinary incontinence and inability to sweat). Shy Drager syndrome may occur alone or in association with the clinical pathological, and magnetic resonance imaging features of striatonigral degeneration and/or olivopontocerebellar degeneration (i.e., multiple system atrophy). Magnetic resonance exams in Shy Drager syndrome patients unassociated with striatonigral degeneration or olivopontocerebellar degeneration are normal.

Progressive Supranuclear Palsy

The diagnosis of progressive supranuclear palsy can be established clinically by the symptoms of axial rigidity with neck extension supranuclear opthalmoplegia, with particular impairment of vertical eye movements, pseudobulbar palsy, extrapyramidal symptoms, and occasional dementia.

At 1.5T, long TR/long TE images progressive supranuclear palsy patients show putaminal hypointensity. In addition, the superior colliculus is the subcortical region of oculomotor control and is impaired in progressive supranuclear palsy. Some, but not all progressive supranuclear palsy patients show focal atrophy and/or hypointense signal on long TR/long TE image of the superior colliculus. The periaqueductal region of the midbrain is also implicated in the pathology of progressive supranuclear palsy. Some patients show slight hyperintense signal on the long TR sequences of the periaqueductal gray matter.

Diseases of the Motor System

Motor Neuron Disease (Amyotrophic Lateral Sclerosis)

Motor neuron diseases are a heterogeneous group of syndromes in which the upper and/or lower motor neurons degenerate. Amyotrophic lateral sclerosis is the most frequent type of motor neuron disease with an annual incidence rate of 0.4 to 1.76 per 100,000 people. Most patients are 50 years and older at the onset of symptoms. The disorder progresses relentlessly; about half the patients are dead within 3 years and 90% within 6 years.

Amyotrophic lateral sclerosis is characterized predominantly by degeneration of the corticospinal tract and lower motor neurons. The extent of corticospinal tract degeneration varies along the neuraxis. It can usually be traced from the lower portion of the spinal cord up through the medulla. Occasionally, degeneration of motor fibers proceeds further cephalad sequentially through the pyramidal tracts of the brainstem and cerebral peduncles; the posterior part of the posterior limb of the internal capsule, corona radiata, to the motor cortex. On magnetic

resonance, atrophy and hyperintense foci on long TR sequences of the corticospinal tract is seen. This high signal likely reflects characteristic histologic changes of myelin loss and gliosis. Hypointense signal on the long TR/long TE sequence may also be found in amyotrophic lateral sclerosis, due to iron deposition. The anterior and lateral portions of the cord may be atrophic and flattened due to cell loss of motor neurons in the anterior horns and corticospinal tracts. Magnetization transfer measurements are useful for detecting abnormalities associated with degeneration of the pyramidal tract in patients with amyotrophic lateral sclerosis.

Proton magnetic resonance spectroscopy reveals decreased N-acetyl values in the sensorimotor cortex and brainstem of patients with amyotrophic lateral sclerosis, consistent with neuronal dysfunction and/or loss.

CLINICAL ALGORITHM(S)

Algorithms were not developed from criteria guidelines.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate selection of radiologic exams to diagnose patients with neurodegenerative disorders.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical

consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Braffman B, Drayer BP, Anderson RE, Davis PC, Deck MD, Hasso AN, Johnson BA, Masaryk T, Pomeranz SJ, Seidenwurm D, Tanenbaum L, Masdeu JC. Neurodegenerative disorders. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):597-605. [35 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1999

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria™.

GUIDELINE COMMITTEE

ACR Appropriateness Criteria™ Committee, Expert Panel on Neurologic Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Names of Panel Members: Thomas Masaryk, MD; Burton P. Drayer, MD; Robert E. Anderson, MD; Bruce Braffman, MD; Patricia C. Davis, MD; Michael D. F. Deck, MD; Anton N. Hasso, MD; Blake A. Johnson, MD; Stephen J. Pomeranz, MD; David Seidenwurm, MD; Lawrence Tanenbaum, MD; Joseph C. Masdeu, MD, PhD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

The ACR Appropriateness Criteria™ are reviewed after five years, if not sooner, depending upon introduction of new and highly significant scientific evidence. The next review date for this topic is 2004.

GUIDELINE AVAILABILITY

Electronic copies: Available from the American College of Radiology (ACR) Web site.

Print copies: Available from ACR, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on July 31, 2001. The information was verified by the guideline developer as of August 24, 2001.

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